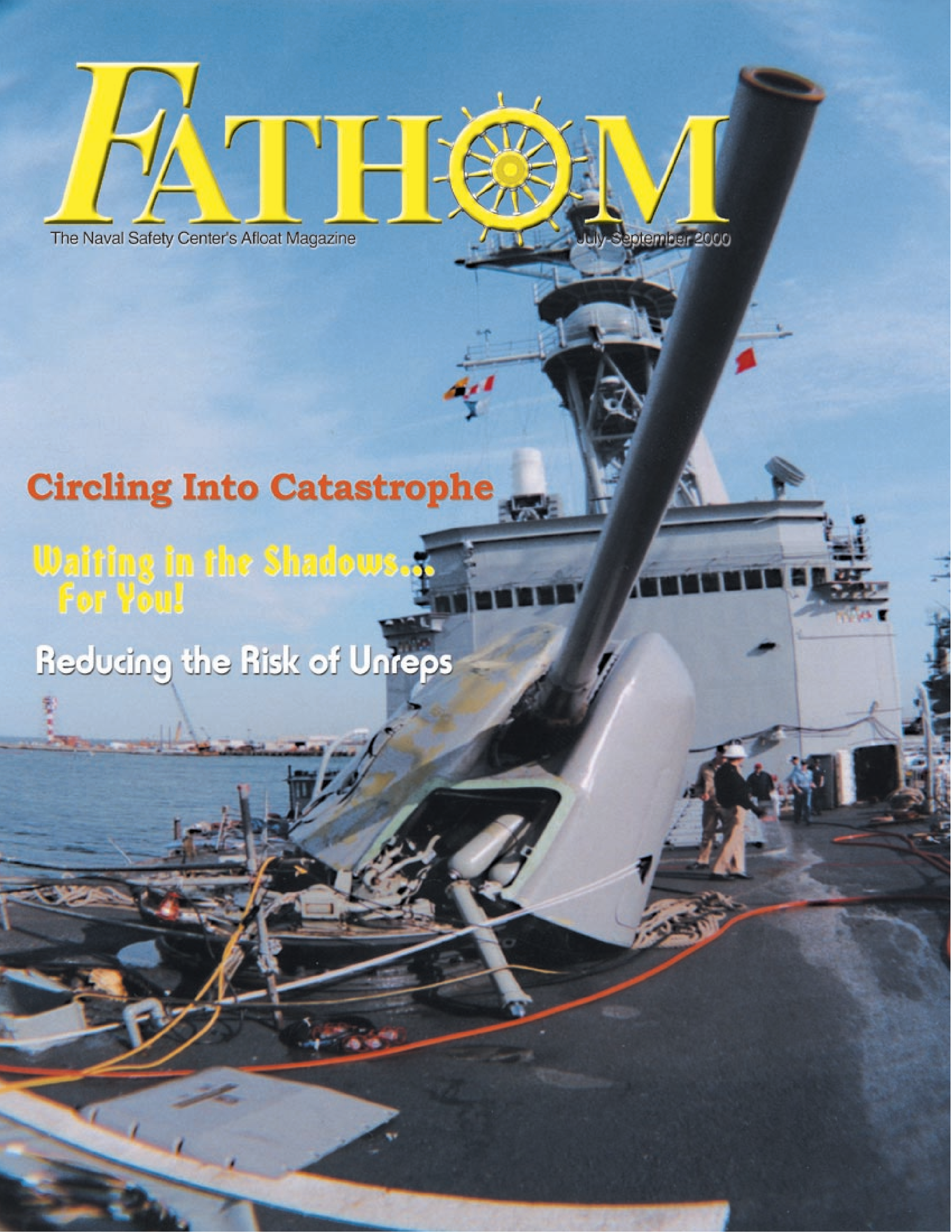

FATHOM
The Naval Safety Center's Afloat Magazine
July-September 2000
Circling Into Catastrophe
Waiting in the Shadows... For You!
Reducing the Risk of Unreps

FATHOM

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July-September 2000

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Features

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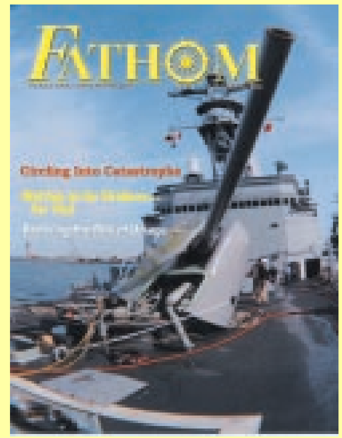
Sections

Articles



Cover

A destroyer's forward gun mount shows some of the damage caused by a collision with a 27,000-ton, 657-foot container ship. Navy photo by PH2 Matthew J. Thomas

Adjusting to Change Is Part of the Game

By Lt. Tom Binner,
Naval Safety Center

During the second quarter of FY00, we had three groundings. The investigations of those mishaps revealed a common problem: People started with a plan but didn't adjust their plans to allow for new hazards created when the situation changed. Using operational risk management (ORM) could have prevented these mishaps.

A plan based on the ORM process demands that we accept the risks when the benefit outweighs them. However, we must not accept any unnecessary risks. Instead, we must manage risks by planning, and we must make risk decisions at the right level. We need to trust in our indicators and people. Each of us has the ability to recognize when something isn't right, even if we don't always know why.

That's the message our surface ORM training team has taken to the fleet since January this year. Through June 30, 70 ships on the east and west coasts have hosted the training. Here is a sampling of what people aboard some of the ships said about this training:

USS *Abraham Lincoln* (CVN 72) - "Routine, as well as less frequent, events have benefited from the application of in-depth and deliberate levels of risk management. In particular, we have seen a measurable improvement during our pre-deployment work-ups through the careful implementation of ORM into the drill-planning process by our ship's integrated training team. The result is zero mishaps thus far. Our next step is to include ORM in our indoctrination training for junior personnel. Then, onward toward a goal of the ORM process becoming a natural thought process for every officer, CPO and Sailor aboard *Abraham Lincoln* in everything we do. The full benefit of ORM will be realized once it becomes part of the 'corporate' culture."

USS *Carney* (DDG 64) - "The training is very effective because it's tailored to all aspects of a Sailor's life: from availabilities, unrep and PMS to driving and working around the house."

USS *O'Bannon* (DD 987) - "The training provided us with the tools to assess hazards and make risk decisions for all tasks, on and off duty."

USS *Spruance* (DD 963) - "The training was 'to the point.' The scenarios used during the training made sense and clearly showed ORM can be used in everything we do."

Afloat Training Group, Mayport - "The training grabbed my interest. The breakdown and step-by-step walk-through of the five-step process enabled me to fully understand how to apply ORM."

Share **your** stories with us, so we can pass them along to the fleet in future issues of *Fathom*. Sound off and be counted for ORM. It's not a program; it's a way of life.

The author's e-mail address is tbinner@safetycenter.navy.mil.

A Better Way To Open Cans

By HMCS(SS) Brett Darnell, Naval Safety Center

Do you have trouble opening those large square cans of coffee and sugar used in shipboard galleys? We've all heard tales about Sailors who used a knife, dough cutter or other pointed object to open one of the cans, only to cut themselves on the jagged edge left along the inside lip of the can or on the lid. This problem, however, is a thing of the past for mess-management specialists and food-service attendants aboard USS *Norfolk* (SSN 714).

During a visit aboard *Norfolk* as part of a survey team, I saw a homemade tool that has nearly eliminated all cuts from improperly opened cans. It looks evil but is really harmless. The tool's edges and point aren't sharp enough to cut you, but they slice through large cans of coffee and sugar like a hot knife goes through butter. As you place the point on the edge of a can's lid and apply a little body weight, the tool starts cutting. The edge of the can and its lid are turned downward during the process. When the job is done, you simply have someone don a pair of cut-resistant gloves and dispose of the lid.

The best news about this tool is that you can make it yourself or have someone else do it for you. *Norfolk* Sailors used three-quarter-inch-round, stainless-steel bar stock to make the tool's "spine," which is about 18 inches long. The stainless steel allows users to keep the tool clean and sanitized. The Sailors then spot welded a triangle, made of four- or six-gauge stainless steel about 8 inches wide (the width of the square cans), onto the spine.

Perhaps we can't change the shape of the cans we use in the galley, but we can find a better way to open them.

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This multi-million-dollar tragedy forced the cancellation of a scheduled deployment.

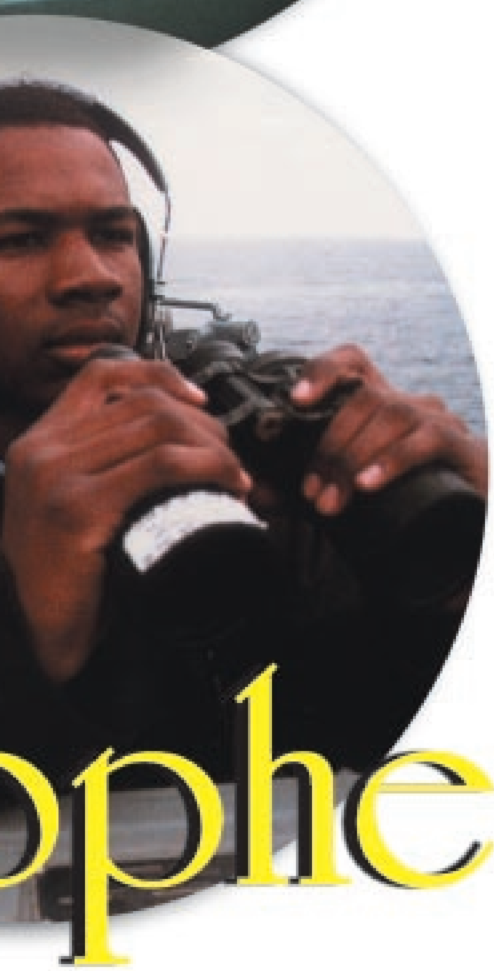
Navy photo by PH2 Matthew J. Thomas

Navy photos by PH2 Felix Garza

ng Into

By Cdr. Elizabeth Rowe, USN (Ret.)

Watching a radar sweep circle the scope, again and again, like this CIC watchstander is doing, can get really boring.



The bridge lookouts in this mishap should have been scanning the horizon for contacts like the Sailor here is doing. Instead, they huddled and talked to each other.

ophe

On the ship, the radar sweep circles the scope, again and again. Same three anchored ships. The CO checks with the OOD.

"Yes, sir, we'll keep circling the buoy at 2,000 yards," the OOD says. To calibrate ship's antennas, he thought the ship had to circle one particular buoy, steady at 2,000 yards and 15 knots.

"It's been a long week," the OOD thinks. "Weapons onload had some problems, but we got through it. Not much sleep in the last few days, but we're accomplishing the mission. We'll deploy in about a month, and if we keep working really hard, we'll have everything ready. Pull in tomorrow...can't wait to see my wife and kids...time with them is short."

Everyone aboard would agree it had been a long week. But before this night is over, it will become agonizingly longer.

The conning officer has the tough job of keeping the proper distance from the buoy. He stands in the port-side door, one foot on the bridge, the other on the bridge wing, keeping the buoy in sight at all times. Every minute or two, he has to make a rudder change, or the ship's circle won't be exact. "I've got so much to do," he probably thinks, "and it'll be midnight before I get off this watch. Got to get some sleep. Maybe I can grab a few hours, then get up before reveille and get started."

The CO retires to his at-sea cabin. "So much paperwork!" he reflects. "Just trying to keep operations flowing makes it tough to get to the admin stuff. I've got to get it done, though, because the crew is counting on my getting those fitreps and reports out on time. My best OOD is on the bridge. He did so well during the last exercise; I'm sure he'll take care of the ship."

The XO drops by the CO's cabin. He's been on the bridge the last couple of hours training the conning officer. Now, another

conning officer is on duty. The XO asks the CO, “Will it be all right if I go back to my cabin and complete the POD?”

“What’s the status on the contacts?” the CO first queries.

“Same, sir, three anchored,” the XO answers.

“OK, XO, go ahead and take care of your paperwork.”

In CIC, the watch has been relieved. A sleepy watch officer relaxes, confident that his watch supervisor has the bubble. The surface tracker and DRT operator rotate once an hour. “Same three contacts...this is really boring,” they think. Mistakenly, everyone seems to believe that because they are keeping station on the buoy, other ships will stay out of their way.

Around the ship, Sailors are settling down for the night. The DCA has retired to his stateroom, and an SK2 and an EN3 settle into their racks. Meanwhile, an IC3 grabs some chow on the messdecks before going on watch, and an EW3 stands in the forward smoking area talking to his buddies.

No one notices when one of the radar contacts is 10, then 9, then 8 miles away. Finally, the surface tracker sees a contact pop up at 7 miles. “Looks like it will come within 4 miles of the ship,” she reports to the CIC watch supervisor.

He isn’t worried because he, too, believes whatever ship is out there in the darkness, steaming toward them, will see them and stay out of their way. However, he tells her to report the contact to the bridge and to keep an eye on it. He doesn’t think to remind the CIC watch officer or the OOD that the standing night orders require reporting contacts that come within 10,000 yards or less to the CO.

A new JL phone talker on the bridge takes the surface tracker’s report and writes the information on a grease board. He then tells the OOD they have a new contact. The OOD doesn’t hear that or any of the subsequent reports from the JL phone talker.

The surface tracker watches the contact and talks to the DRT operator, who keeps marking it. The distance is closing, and the radar sweeps that had seemed so dull and repetitive are beginning to tell a new, disturbing story. When the surface tracker realizes the contact is going to come within 1,100 yards, she passes this new estimate to the CIC watch supervisor.

“Do a maneuvering-board solution,” he says. It’s now 2330.

The lookouts are huddled on this cold night. Bored, tired and chilled, they talk to each other, rather than scanning the horizon. They’ve done this before; the lights from shore, as well as those from anchored ships, keep changing as they circle, but they assume no one will cross their path.

The quartermaster under instruction on the bridge sees a ship to starboard and asks the signalman, through sound-powered headphones, “What ship is out there?”

The signalman, looking confident, tells the quartermaster under instruction it’s one of the ships seen earlier at anchor and is nothing to worry about. The forward lookout now sees a ship to starboard and tries to let the bridge know through sound-powered phones, but there’s too much chatter on the circuit.

Two minutes later, the CO hears a sound like an engine out the port hole of his cabin. He gets up to go to the bridge and see what’s happening. He isn’t going to like what he sees. The surface tracker in CIC sees the blip of a contact converge with the center of the radar screen. She yells, “They’re going to hit us!” It’s now 2333.

In the port-side door, the conning officer sees something out the corner of his eye to starboard. Looking up, away from the buoy, he sees a huge, dark object. “What’s that?” he asks the OOD.

The OOD says, “What?” then looks in the direction in which the conning officer is staring in disbelief. The OOD shouts, “All stop! All back full! Sound the collision alarm!”

At that instant, the CO appears on the bridge and adds, “Set general quarters!” The collision alarm goes off, then comes the grinding crash of a 27,000-ton, 657-foot container ship, moving at 18 knots, slamming into the ship’s starboard side. For endless moments, the air is filled with the sickening sound of steel against steel. The only thing that keeps the bow from being sheered off is the forward gun mount. It's now 2334.

The CO runs to the starboard bridge wing and, with his right hand, reaches up and touches the side of the container ship as it gouges its way down the starboard side. He gets on the bridge-to-bridge phone and calls the container ship to see if everyone is OK.

In DC central, the DCA arrives from his stateroom, where he heard the alarms and felt the collision. He scrambles to set up for GQ. It takes eight minutes to set Zebra throughout the ship. His biggest problem is securing a ruptured firemain forward.

The SK2 *(see page 6)*, whose GQ station is Repair 2, hears the loud crash and feels the ship tilt. She smells fuel and dresses as fast as she can to get to her GQ station. Although afraid, she persuades herself to stay calm and make sure she does her job.

The IC3 *(see page 6)* hears the GQ alarm and grabs a table when the ship lurches. He also hears bumping and scraping as the container ship moves down the starboard side. En route to his GQ station, he sees black smoke coming from the starboard forward passageway and runs to secure power, in case a fire has broken out. Much later, when things have settled down, he cries with his friends, relieved they are alive and well.

The EN3 *(see page 6)* awakens, startled by the sound of the engines reversing, followed closely by the alarms sounding. He hears a loud crash and fears that weapons brought aboard during the recent onload are exploding. On his way to his GQ station, he, too, sees smoke and starts dogging down doors. The adrenaline is rushing, and he worries that death may be near for himself and shipmates. He sees a lot of new Sailors stumbling and struggling because they are so afraid.

Meanwhile, the collision throws the EW3 who had gone to smoke a cigarette into a bulkhead. Recovering, he heads for his GQ station. While moving through the passageways, he shakes a few Sailors who are in shock and urges them to get to their stations. He is taken aback when he gets to the fo'c's'le and sees the damage. Later, he considers how lucky he may have been. "If the conning officer hadn't ordered back full, the collision might have occurred right where I was smoking," he realizes. "I could have died."

What caused this more-than-60-million-dollar tragedy in which a deployment had to be rescheduled?

First, there was a loss of situational awareness by many watchstanders. The OOD, conning officer, lookouts, quartermaster, and signalman were unaware of the container ship until moments before the collision. Even then, most of them didn't immediately see what a desperate situation they were in.

There were many reasons, but the key was an attitude of over-confidence, which kept them from trying to get a handle on the big picture. The crew had circled this buoy several times before without incident. A brief the previous day had revealed no new concerns, so the thinking was, "With no new dangers, we don't need any special directives in the night orders." But, operational risk management (ORM) would have helped. No one had discussed how to do the maneuvering board when the ship is in a constant turn. The lookouts and the signalman didn't realize the key roles they played in keeping the ship out of danger.

Next, fatigue was a factor. The ship's deployment schedule had been moved up several months, and, as a result, many requirements were compressed. In their effort to do everything on time without complaining, the crew had driven themselves to a state of constant fatigue. A weapons onload had been completed just the night before the mishap. It had been difficult, and many crewmen had worked through the night to finish the job. Reveille had sounded very early the day of the collision, and the crew had started calibrating the antennas immediately after sea-and-anchor detail. There was no time to rest or re-think what the dangers were, particularly for the CO and XO.

Another factor was that people were too focused on one task, without keeping an eye on the big picture. Everyone was bore-sighted on the calibration buoy. They had the mistaken notion that as long as they kept the buoy at the right distance, all would be well. Obviously, that was not the case here or in many other "routine" events.

Poor communications among the watchstanders also was a factor. The OOD and the CIC watch officer didn't talk much. No one monitored the bridge-to-bridge radio-telephone or used it to warn ships in the area about what the destroyer was doing. The JL phone talker, lookouts and the CIC surface tracker didn't ensure the bridge watch knew everything they knew.

Finally, supervision was lacking. Neither the XO nor the navigator stayed on the bridge during this critical evolution, as required by the ship's navigation bill. In CIC, the watch officer had put his watch supervisor in charge. The boatswain's mate of the watch wasn't supervising the lookouts or the JL phone talker. The OOD didn't speak to his bridge team about making sure they stayed alert to possible hazards during the watch.

The people involved in this mishap were all talented and capable men and women who lost situational awareness and were blind to the risks related to this calibration event. If the crew had used ORM, they would have gained valuable insight into the possible hazards they faced and could have taken steps to minimize them. Don't rely on the standard procedures we have in place for everyday operations to protect you. Investigate all the possible things that can go wrong and know what you're going to do if they happen—before an operation starts.

The author was assigned to the Naval Safety Center when she wrote this article.

Why This Collision Occurred

By Cdr. Elizabeth Rowe, USN (Ret.)

Imagine you're a high-school baseball coach, and one of your players who has been hitting well starts to lose his edge. You have some data: when the slump began, what pitchers he faced during his off games, and what his batting average was and is. Why is he in the slump, though?

If he isn't injured, finding the answer to that question will require you to investigate. Perhaps you find that he has a drug or alcohol problem. Maybe he's having trouble at home or in school. Once you establish the "why," it becomes clear what to do about the problem and help him return to his winning ways.

We believe mishaps are similar to this example. If we can identify the causes, we're much better prepared to correct a problem and reduce the number of mishaps. In the *NavOSH Program Manual for Forces Afloat*[1], we outlined a new method for describing causes when you report afloat mishaps. Causes fall into four main categories (human, material or equipment, procedures, and design). Beneath these four categories are a number of subcategories. Keep in mind that any mishap, particularly a major one, can involve more than one cause. When you report a mishap, you must examine and describe all the causes.

Our mishap investigation into the collision between a destroyer and a merchant ship offers a good example of this new method. This mishap had only human causes, which is typical. Here's the narrative of one cause in the collision: The OOD failed to stand a proper watch. This is a human cause because it's associated with people. It falls under the subcategory "unsafe supervision" because a supervisor, the OOD, didn't perform his duties correctly. We further break this cause down under the heading "inadequate" because the OOD didn't ensure the safe operation of the ship.

Here are three more examples:

● JL phone talker failed to adequately pass info from CIC and lookouts to the OOD. This cause also is human, but the subcategory is "unsafe act" because a person did something unsafe. More specifically, it's an "error" because it was unintentional.

● Rescheduled deployment compressed the ship's schedule, resulting in physical fatigue throughout the ship. In this human cause, the subcategory is "unsafe crew condition" because the crew's performance was affected by their personal condition. We categorize this as "adverse physiological condition" because you have a physical condition (fatigue) with psychological effects.

● ORM was not used to assess risks for the shiphandling part of the evolution. This cause is titled "organizational influence" because it reflects the effects of policy, culture, and rules or regulations on the performance of the crew. In this case, the effect was "internal" because the decision not to implement ORM was controlled by the CO and his subordinates, instead of outside influences.

Using these identified causes, we can begin to measure trends in these factors and focus analysts on developing methods to reduce the frequency of the causes. With your help in reporting shipboard mishaps, along with identifying the "why" involved, we can start correcting the causes and reducing the number of mishaps that occur in the fleet.

The author was assigned to the Naval Safety Center when she wrote this article.

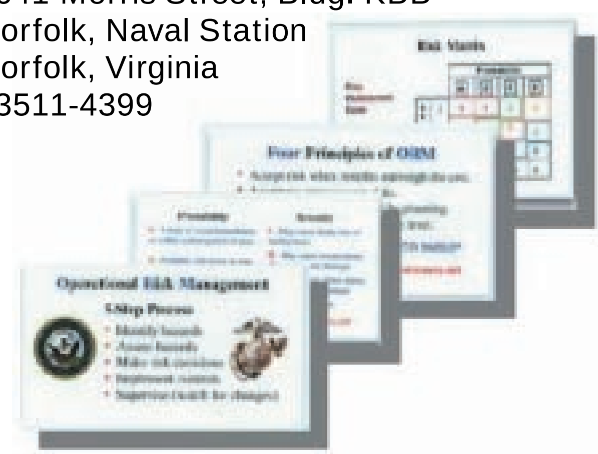
For More Info...

[1] The new method for describing causes when reporting mishaps is described in change 2 to OpNavInst 5100.19C.

Navy photo by PH2 Matthew J. Thomas

How To Order ORM Cards

Contact:
Defense Automated Printing Service
1641 Morris Street, Bldg. KBB
Norfolk, Naval Station
Norfolk, Virginia
23511-4399



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Reducing the Risk of Unreps

USS *Vincennes* (lower left) steams alongside the trailing line of barrels, maintaining unrep speeds and distances.

When two ships operate this close together, there is little time for recovery if one loses steering control.

By Ens. John Payne,
USS Vincennes *(CG 49)*

When large ships rock 'n' roll within 150 feet of one another to replenish stores and fuel, there's always a risk to personnel and equipment. The greatest risk during an unrep is loss of steering control. Rough seas and the close proximity of ships to one another leave little time for recovery if something goes wrong. If you're not prepared, the results can be disastrous.

For example, it cost more than $5 million to repair the damage to an AOE and a CVN that collided during an unrep in 1995. In that mishap, the seas and winds were such that the helmsman aboard the AOE was continually using left rudder to keep his ship on the designated replenishment course. When a potential problem with rudder control arose, the AOE's crew executed the emergency-steering bill. This procedure initially involved placing the rudder amidships, which let the AOE's course drift to the right.

Personnel aboard the CVN knew their counterparts aboard the AOE had a steering problem, and the CVN turned to starboard to maintain distance between the two vessels. However, one requirement was overlooked in this course change: The bridge-watch team aboard the CVN didn't tell their counterparts aboard the AOE what they were doing. Once the after-steering helmsman aboard the AOE gained control and completed rudder checks, he put the rudder over left to regain the ordered replenishment course.

A series of events, including the start of an emergency breakaway and the shift of rudder control back to the bridge on the AOE, occurred in the next few minutes, and the AOE turned back to the left. Meanwhile, the CVN's course kept moving to the right. Last-minute orders to the helmsmen on both ships served only to reduce the angle of impact.

Finding realistic training for emergency situations like this is difficult. How do you safely demonstrate what happens when ships are moving near one another during a connected replenishment? That's a question we researched aboard USS *Vincennes* until we found an answer: Make a bumper-proof "oiler." The *Vincennes*' "oiler" let conning officers safely see what happens in a casualty. More importantly, it provided an opportunity for ship-control teams to respond to alongside-steering casualties.

Here's the procedure we used. We connected several barrels to a 500-foot-long line and towed it at unrep speeds behind a ship's boat. The boat crew deployed the barrels at distances that would give a conning officer a reference point to simulate the engaged side of a replenishment ship. To keep the experiment safe, the towing boat remained well ahead of the approach ship. Once alongside, bridge watchstanders measured distances to the simulated replenishment ship using a laser range finder.

With the "oiler" underway, *Vincennes* made her approach alongside the trailing line of barrels and maintained unrep speeds and distances. Members of the ship-training team (STT) then put the rudder over, simulating a casualty that sent the ship veering toward the "oiler." When the ship hit any of the barrels, the conning officer ordered, "All back full," and steered away from the barrels to avoid fouling the line.

Our first test involved putting the rudder over toward the "oiler" at 10 degrees to see how long it took before *Vincennes* hit the barrels. Discounting the Venturi effect (the suction created between two large bodies moving parallel to one another in water), the jammed 10-degree rudder afforded about 40 seconds before contact was made. The second test repeated the same experiment, but with a rudder jammed at 30 degrees. Collision this time occurred in 28 seconds.

Once watchstanders realized how quickly a catastrophe can happen, the STT members then imposed a series of drills to test the reaction time of the watchstanders. In this phase, the STT members put the rudder over 10 degrees toward the "oiler," then allowed the bridge-watch team a chance to recover steering through normal engineering operational sequencing system (EOSS) procedures. To avoid a collision, the watchstanders had to recognize the jammed rudder, respond to the casualty, then steer the ship away from the "oiler." Our master helmsman quickly noted the casualty and switched pumps and cables. After regaining control, he shifted the rudder away from the "oiler" to avoid contact. The watchstanders successfully finished this test in less than 40 seconds.

The second loss-of-steering-recovery drill again simulated a 10-degree jammed rudder. However, the master helmsman wasn't able to regain steering just by shifting pumps and cables; he had to transfer steering control to after steering. The after-steering helmsman shifted the rudder, using the local steering panel. Despite the added time required by shifting steering control aft, the after-steering helmsman was able to restore control and shift the rudder away from the "oiler" in time to avoid a collision.

Our final test sought to answer the long-standing debate about whether it's possible to counter the effects of a 10-degree jammed rudder with engines. When STT members jammed the rudder this time, the conning officer immediately ordered a twist (ahead flank, back two-thirds) to counteract the effects. Despite engine twists away from the "oiler," *Vincennes* could not overcome the rudder problem and hit the barrels. Although the engine twist didn't prevent collision, it did slow the swing of the ship and increased the amount of time before collision occurred.

What did we learn from these experiments? In all cases, we had less than a minute to respond to a casualty, recover steering control, and shift the rudder to avoid collision. We also proved it's unlikely you'll be able to counter a jammed rudder, using engines to twist the ship. The most important lesson learned from these experiments, according to the CO, "is that every second counts. First, you have to be proactive. Second, helmsmen and safety observers instinctively must execute planned responses. Last, you have to practice."

Unfortunately, the results from our experiments aren't completely accurate. We didn't have a perfect model, and, of course, we couldn't simulate the Venturi effect. Nevertheless, we have a good idea how important it is to be prepared and react quickly in the event of a loss of steering. With planning, training, and operational risk management, it's possible to avoid a catastrophe, even in the most dangerous operations.

How To Oper

By BMC(SW) Mike Thibault, Naval Safety Center

"Something isn't right about that picture," I thought, as I watched two Sailors in the distance paint a ship's forward superstructure from a manlift basket. It didn't take me long to figure out the problem. The Sailors weren't dressed correctly; neither had any type of flotation device or a helmet.

After thinking about all the risks and hazards those two Sailors faced, I walked over to their ship and stopped the operation. Once their feet were on the ground, I started asking the two Sailors questions about the procedures for operating manlifts. Neither could answer a single question.

I explained the procedures, then went to the OOD and told him what I had done. His response was, "I didn't even know anyone was working over the side."

As if that incident wasn't enough to open my eyes, the next day, I was walking down another pier when I saw two more Sailors doing preservation work from a manlift basket. Both were wearing the correct gear, but as I soon would learn, there was a third person in the basket—a PO2, who was operating the manlift with no personal protection. He also was the one assigned to watch the whole operation.

It doesn't take a rocket scientist to figure out these two incidents cried for operational risk management. If you want to avoid problems while using manlifts, I recommend you follow these steps (which are based on standards of the American National Standards Institute and the Code of Federal Regulations) for using lifts on and over land:

When operating a manlift like this one, avoid problems by using operational risk management.

rate a Manlift

Before an operation starts, the operator must:

☞ Be qualified and licensed according to local instructions.

☞ Read and understand the operating instructions and safety rules for the equipment being used.

☞ Understand all decals, warnings and instructions displayed on the work platform.

☞ Send the OOD and CO a checksheet[1] that requests permission to work over the side or aloft.

Before each work shift starts, the operator must:

☞ Inspect for defects that would affect a lift's safe operation. Be alert for cracked welds or other structural defects, leaks in hydraulics, damaged control cables, loose wires, or bad tires.

☞ Test the controls to make sure they work.

☞ Check the operating condition of the brakes, lights and other automotive-operating accessories, such as horns and warning devices.

Before each elevation, the operator must:

☞ Check for overhead obstructions and high-voltage conductors.

☞ Elevate the work on only a firm, level surface.

☞ Make sure the load and its distribution on the platform is according to the manufacturer's rated capacity. Never exceed the rated work load.

☞ Use the outriggers or stabilizers, if required, according to the manufacturer's instructions.

☞ Make sure guard rails on the platform are installed correctly, and the gates or openings are closed.

☞ Check all occupants' safety belts or harnesses and lanyards, making sure they are attached correctly. Don't attach lanyards to objects outside the basket.

Before and while operating a lift with its platform elevated, the operator must:

☞ Look in the direction of and keep a clear view of the path of travel. Make sure the path is firm and level.

☞ Maintain a safe distance from obstacles (ahead and above), debris, holes, depressions, ramps, and other hazards.

☞ Set the brakes and chock the wheels once stopped.

While operating a lift, the operator must not:

☞ Use ladders or makeshift devices on the platform so workers can reach higher.

☞ Climb up or down extendable arms.

☞ Sit on or climb on the edge of the basket.

☞ Delay reporting any defects or malfunctions to the supervisor.

☞ Engage in stunt driving or horseplay.

The Naval Safety Center also recommends that lift operators observe these rules when working on, around or over water:

☞ Wear hard hats with chin straps.

☞ Wear life jackets. Do not wear safety harnesses or lanyards attached to the lift.

☞ When using a lift on a barge, secure the lift to the barge with wire or tie-downs.

☞ Do not alter or disable safety devices or interlocks.

☞ Make sure a supervisor watches the lift operations from a pier or barge.

☞ When people are working on a ship's sides, the supervisor must ensure the deck above the lift is free from hazards, especially falling objects.

If you follow these tips, you can raise your productivity level without raising your mishap rate.

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For More Info...

[1]Copies of the checksheet you need for working over the side or aloft are available in Appendices C8-A and C8-B of OpNavInst 5100.19C (with change 2).

Small Craft on the Rocks

By BM1(SW/SCW) Don Watson,
USS Shreveport *(LPD 12),*
and MMC(SW/DV) Kevin Gest,
Naval Safety Center

What can a craftmaster do when an anchor line gets wrapped around both screws of the 65-foot Navy craft he is operating? Not much.

The day probably seemed like any other for the craftmaster and his crew as their boat pulled away from the pier and headed to a local dive site. You can bet, though, if they had known what lay ahead, their operational-risk-management (ORM) radar would have been radiating long before the morning coffee finished brewing. They planned to anchor near a jetty, which usually attracts fish and makes diving more interesting. What they didn't plan was how they would counter the effect that wind and seas would have on their craft.

After arriving at the dive site, they let go the anchor downwind of the craft. Winds were blowing shoreward. The seas immediately took control of the vessel, sending it over the anchor and toward the jetty. When the craftmaster tried to maneuver the boat, its screws became fouled in the line. The boat crew could do nothing but watch the wind and current drive the crippled craft onto the jetty rocks. Divers didn't have enough time to cut away the line.

The divers reported that both shafts were damaged, so the craftmaster radioed for help to remove the vessel from the rocks and to get towed back to the command. A full survey revealed damage to both screws, shafts and running gear, amounting to $18,000. The craft was out of service for 45 days.

How do you avoid problems like this? By getting back to the basics. Craftmasters must understand the forces that move a craft and be able to use those forces to their advantage. They also must know the maneuvering characteristics of the craft, the effects of propellers and rudders, and the effects of sea and wind conditions.

Shiphandling is an art that can be learned only through experience. Even those who spend years at sea do not claim to master it. Proficient shiphandling requires constant analysis, study, experimentation, and practice. Because of the variables involved, it is impossible to lay down rules that apply to every situation, but guidance[1] is available.

The Navy knows this and has launched efforts to equip today's Sailors with a tool to protect themselves and their equipment. Operational risk management, or ORM, as we know it, is a new, versatile process for looking at things that's comparable to the multi-function tool seen hanging from Sailors' belts. You could call it multi-vision.

ORM is similar to sunglasses because it cuts out distracting glare during critical evolutions. It resembles a microscrope, focusing on details to provide understanding and insight. For an overview, it provides a wide-angle look at the situation on hand, and, like a telescope, it helps plan for what lays ahead. Mostly, though, it's like safety goggles, which keep you from getting poked in the eye by the obvious.

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For More Info...

[1] Anchoring guidance is in NSTM 581 (Anchoring).

A Navy craft lays at anchor as divers and support personnel replace underwater cable and splice in a new section. When the craftmaster and crew in this story tried to achor their craft, they ran into some costly problems.

Ship's Safety Bulletin

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Are You Qualified To Make That Repair?

By EMCS(SW) Jeffrey Hostetler, Naval Safety Center

A Sailor had gone to a fan room with orders to prepare the space for preservation. Before he could start chipping paint with a needle gun, he plugged in a drop light, only to find it didn't work.

Being a responsible shipmate, he verified that the light was plugged into an energized outlet and that the light bulb was OK. He continued to troubleshoot the problem, although he hadn't been trained in electrical theory and related safety precautions. It wasn't until he received a severe electrical shock that he realized he hadn't followed proper procedures. He had failed to disconnect the light before working on the circuit.

People who aren't qualified or trained to work on electrical equipment should leave it alone. People who are qualified and trained need to follow the procedures listed in NSTM 300 for working on de-energized or energized equipment.

In this case, operational risk management would have made a difference. If he had identified the hazard, assessed the hazard, made risk decisions, implemented controls, and supervised his task for change and effectiveness of the controls, he could have avoided the pain of electrical shock. He would have realized he wasn't qualified to repair the light. Let's think before we act and always follow the procedures as they are prescribed.

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Can You Take the Time?

By Lt. Tom Binner, Naval Safety Center

It was a sunny day in the Caribbean, with a sea state 4, when a shipmate decided not to apply time-critical operational risk management (ORM) while passing through a scuttle. His reward for bad judgment was three broken fingers, three days in a hospital bed, and 33 days away from work.

What happened? The victim was en route to his sea-and-anchor-detail station, with modified condition Zebra set, when he failed to identify the hazards of using the scuttle (instead of a grab bar welded to the bulkhead) as a handle. Here's the five-step ORM process he should have followed—and undoubtedly now wishes he had:

- Identify hazards (take two seconds to notice the toggle pin missing from the latch).
- Assess the situation as having a serious consequence.
- Make the risk decision.
- Implement controls (install the toggle pin).
- Supervise himself (use the grab handle instead of the scuttle).

A few seconds of ORM would have prevented a lot of pain for this Sailor. Can you afford to take the time? Let me put that another way: Can you afford not to take the time?

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Correction

The article "What Risks Are You Running in Your Scullery?" in the April-June 2000 issue listed a stock number for a deep-sink strainer basket. This item, however, doesn't have a stock number; it has to be manufactured.

Back Injuries Aren't a Matter of Fitness

By HMC(SW/DV) Tod Keltner, Naval Safety Center

A Sailor who was inspecting a valve in an engineering space turned his upper body to look at a gauge. As he turned, he felt a sharp pain in his lower back. He fell to his knees and had to lie on his back to ease the pain until corpsmen arrived and moved him to medical for evaluation. The Sailor had to take medication and lost two workdays because of his back pain.

This shipmate is one of many who, although in top physical shape, suffer back ailments. Why do we have all these problems? The answer, I feel, lies in what we do as Sailors.

Preventing back injury is easier than correcting it. Accordingly, we need to pay attention during those sessions of back-injury-prevention training we get upon reporting aboard ship and at least annually thereafter (see OpNavInst 5100.19C, with change 2, paragraph A0406, for complete guidance).

We also need to apply the five-step operational risk management (ORM) process to our jobs. For instance, when we're assigned to a working party for loading stores, we should apply ORM like this:

Identify hazards: Know your limits and recognize the obstacles ahead of time.

Assess the hazards: Use the risk-assessment matrix.

Make risk decisions: Reduce the lifting load. Wear back braces if prescribed by medical authority, use conveyors, and ask for help. Weigh the benefits against the cost.

Implement controls: Hold a safety brief and post or coordinate safety procedures from OpNavInst 5100.19C, with change 2, to minimize the identified hazards.

Supervise: Ensure your controls are effective, and watch for change.

For more information about the ORM process, refer to OpNavInst 3500.39 (Operational Risk Management).

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Flangehead Sez: Check Your Connection

By MMC(SW) Philip Anderson, Naval Safety Center

What would happen if the potable-water hoses and connections became contaminated? The crew would be at risk of sickness from waterborne disease. Imagine what would happen if a large number of shipmates got sick at the same time. This situation could affect the ship's ability to complete its mission.

I raise this subject because I'm concerned about the problems I've found with ships' potable-water risers and hose storage. The first step in preventing contamination is to ensure the potable-water hose connections are installed right and the hoses are stowed properly. Here are items you should look for:

- Fill connections shall be closed and capped when not in use. The cap must be attached to the station with a cable or chain.
- The receiving connection must be at least 18 inches off the deck and must be turned down to prevent contamination.
- All potable-water stations must be labeled "Potable Water Only."
- Potable-water hoses must be stowed in designated lockers at least 18 inches off the deck. The lockers must be vermin-proof, locked, and labeled "Potable Water Hoses."
- The only items that should be stowed in the locker are potable-water hoses and connection pieces. The ends of the hoses must be coupled or closed with caps, and connection pieces should be bagged. This locker is not an authorized calcium hypochlorite storage area.
- Instructions listing step-by-step procedures for disinfecting potable-water hoses and risers must be posted in a conspicuous location inside the hose-storage locker.

All of these check points can be found in Section 2 of NSTM 533 and Chapter 6 of the *Manual of Naval Preventive Medicine* (NavMed P-5010). Making sure our potable-water connections are installed correctly and our hoses stored properly are critical in establishing a clean connection.

To order potable-water hoses, use these stock numbers:

1.5-inch hose 4210-01-248-8822
2.5-inch hose 4210-01-254-4912

All hoses are 50 feet long.

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What's Your Excuse?

By ETCS(SS) Mike Feuerlein, Naval Safety Center

Workers must meet certain minimum requirements before drawing hydraulic samples. First, according to OpNavInst 5100.19C, Chapter B3, the material safety data sheet (MSDS) must be available, and the workers must know what the sheet says for the fluid being sampled. Second, the planned maintenance system (PMS) requires that the workers have the MRC in hand for the equipment from which they're taking the sample. Last, the workers must know what the PPE requirements are—an item that's usually found on the MRC.

Nevertheless, on a recent ship-safety survey, we saw Sailors who either lacked training in these requirements or chose to ignore them. For example, a PO2 was drawing samples from a piece of aviation-support equipment without an MSDS or any PPE. We questioned him and corrected the situation. The next day, we saw a PO3 taking samples, with the same discrepancies. Again, we questioned him and corrected the problem.

Procedures outlined in OpNavInst 5100.19C and the PMS are in place for a reason: to protect Sailors from the hazards they encounter in their daily tasks. Some tasks require us to take risks; however, there's a process to help us minimize these risks. It's called operational risk management, or simply, ORM. Approved by the CNO, this five-step process can help Sailors do their jobs more efficiently and safely. All we have to do is use it. Here's how the process should have been applied in taking hydraulic-fluid samples:

Identify Hazards. Hydraulic fluids can cause severe burns to the eyes or even blindness. Some of these fluids act as neurotoxins when they touch the skin.

Assess Hazards. To assess the hazards, we must look at them in terms of probability (chances of occurring) and severity (how serious are the effects of the hazards). We have to consider that we probably could get hydraulic fluid in our eyes or on our hands while taking a sample. The severity of this hazard is serious because it could cause a permanent disability (e.g., blindness or problems with the central nervous system).

Make Risk Decisions. Should we take hydraulic-fluid samples? Yes, we need to take samples to ensure our oil is clean so it doesn't damage equipment. Is the task too risky? No, it isn't, because we have ways (methods) to reduce the risk to an acceptable level.

Implement Controls. By wearing PPE and heeding the warnings on the MSDS and in OpNavInst 5100.19C, we can minimize the hazards in this task.

Supervise. We must ensure that workers use the procedures. We also must watch for changes in the original plan and modify the process as necessary to minimize the risks.

Specific references will vary from one ship or one piece of equipment to another, but always remember to refer to the PMS requirement for the equipment you're working on, as well as the MSDS and OpNavInst 5100.19C.

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Equipment on Rubber Shock Mounts Can Be Deadly

By EMCS(SW) Keith Churchman, Naval Safety Center

Improperly grounded electrical equipment poses a shock hazard to Sailors. That's why we have electrical-maintenance procedures, ground-indicating-light circuitry, and ground-isolation procedures. Unfortunately, these safeguards don't always help if shipboard equipment mounted on rubber shock mounts becomes grounded. The ground-isolation-detection circuitry won't indicate a grounded phase if the exterior components of the equipment are not at ground potential because of a missing or degraded ground strap.

Keep in mind that current always takes the path of least resistance, and that path could be through you if the equipment doesn't have a grounding strap. MRC 24M-1 on MIP 3000 and Mid-Std-1310G list the requirements for equipment grounding. Inspect all your electrical equipment mounted on rubber shock mounts for proper grounding straps and make sure they work. Otherwise, it's just a matter of time before your safety officer has to file another mishap report.

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Getting Nitrogen-Fill Kits for Your AN/URA-38 Coupler

By ETCS(SW) Jeff Miller,
Naval Safety Center

Some of you seem to be having trouble finding all the required pieces (small nitrogen bottle, hose assembly, and regulating valve) for the Mk-260/U nitrogen-fill kits for your AN/URA-38 couplers. These kits have several manufacturers. You no longer can find them under AEL 1-91124101 listed on the PMS card. Instead, you have to look under these authorized AELs and APLs: AEL 2-380054014, AEL 7-000000239, APL 74655000, APL N882096944.

Each of these AELs and APLs lists the same stock numbers for the three items in the Mk-260/U kits. The stock number for the regulating valve, however, appears difficult for some to find. If you're one of those, here's the NSN: 4820-01-265-0366.

According to Section 1 (General Information) of the Metrology Requirements List, the output gauge on regulators used to fill AN/URA-38 couplers must be calibrated. Your shipboard gauge-calibration facility can do this job. The most common regulator used in this task is the VSTG-250-B from Victor Equipment Corporation. The output gauge has a 0-to-60 psi range in 2-psi increments. If the gauge you're using goes to 250 psi in 10-psi increments, it isn't sensitive enough to ensure accuracy of the output pressure.

Guidelines for filling the couplers are outlined in MIP 4400/001, MRC Q-20. The PMS card requires that you ensure the output regulator is set to 10 psi maximum to prevent over-pressurization and rupturing of the coupler seal. Because the gauge on the coupler does not require calibration, it is critical to calibrate the output-regulator gauge to ensure proper pressurization. This calibrated gauge will help you detect a faulty pressure gauge on the coupler case and prevent over-pressurization.

When you finish filling the coupler, disconnect the regulator from the bottle and store it in a safe place that will prevent damage to the gauges, the regulator body, and the hose. When you aren't using the nitrogen bottle, screw on the safety cap to protect the valve. Never store the bottle in a locker or secure it to a table leg with nylon line. According to paragraph C2311 of OpNavInst 5100.19C, with change 2, and paragraph 671c of the General Specifications for Overhaul, you must secure the gas-cylinder bottle in a grade "B" shock mount.

Remember, always handle all gas-cylinder bottles with caution because most can be charged up to 1,800 psi, and the large bottles up to 3,000 psi. If the valve on one of those bottles ever blows off, it can cause considerable damage. When removing bottles from a securing rack, always maintain positive control of them. Hold onto the bottle, or lay it on its side and wedge it in position to prevent any movement. Ensure that the pressure hose isn't cracked and the fittings are in good condition. The regulator gauges should be tight in the body of the regulator, and the gauge covers should be completely intact.

For more information on gas-cylinder bottles and their handling requirements, refer to NSTM 550. Anytime you see someone not following these requirements, stop the operation and tell your supervisor. Operational risk management is a team effort designed to keep people alive and equipment safe.

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HOW THE SAFETY OFFICER SAW STARS

By Lt. Todd Nunno, USS Nashville *(LPD 13)*

Suddenly, I heard, "Watch ou...!" I never heard the "t." The next thing I remembered was seeing stars like in a Bugs Bunny cartoon. I felt like a freight train had run over my head.

What happened? A piece of metal shoring had fallen 20 feet and hit me in the head.

It was a beautiful brisk morning, with the ship pierside in Souda Bay, Crete—the perfect time to replace a damaged pipe on the side of the ship. The only way to do this job was to use a manlift or "cherry picker." Although the one available wasn't ideal (it had a rolling ramp and hydraulic platform on the end, instead of the usual basket), we decided we could use it.

Sailors work on a ship's side from a basket on the end of a manlift. Unfortunately, the safety officer in this story had to make do with a manlift that had a rolling ramp and hydraulic platform on the end, instead of the usual basket.

Another problem was that the platform could not hold the weight of more than one person. The hydraulic solenoid bled off when more weight was added. Being accomplished innovators, we used two pieces of 10-foot, adjustable metal shoring to hold up the ramp and keep it from collapsing. We also tied safety lines from the end of the ramp to the ship's catwalk to hold the ramp against the ship's side while we worked. For extra safety, we blocked the manlift's 5-inch metal wheels and applied the rusty brakes (which we would find didn't work).

At last, we had the 400-pound ramp secured to our 17,000-ton slightly rolling ship. We—or, at least I, the ship's safety officer—felt the ramp would roll with the ship, without posing a hazard. I changed my mind, though, while watching the repairs from the ground. The metal shoring we had used to hold up the ramp worked loose and fell, hitting me in the noggin.

Three stitches and a bruised ego later, I had learned some valuable lessons. First, watch out for yourself, especially if you're the ship's safety officer, because you're just as vulnerable to injury as anyone else. Second, if there's a risk of something hitting you in the head, wear a hard hat. Third, resourcefulness is good, but only to a point: where it goes past common sense to common hazard.

Waiting in th

For You

By MMC(SW) Phil Anderson,
Naval Safety Center

I lurk in the shadows, waiting to strike. A chance finally comes when my doors open, a warning bell rings, and my machinery starts its slow, hypnotic motion. Because Sailors often are inexperienced and careless (two traits that are my friends and allies), I lure many of them into my grasp. My latest victim was a young man whom I slowly choked to death.

My past is notoriously gruesome; I have a long history of mutilating or asphyxiating Sailors. I attack without hesitation or remorse, snuffing out lives every chance I get. Those unfortunate people who get too close seldom live to see the results.

In case you haven't figured it out yet, I am a vertical-package conveyor, used to upload and download stores within a ship. Like the airman I recently killed, many Sailors come to know me while working as a food-service attendant (FSA) on the mess decks. Because of their inexperience and lack of training, FSAs are at great risk around me.

My vicious past is what prompted the Navy to install safety devices to protect Sailors from my deadly clutch. A safety shield, limit switches, a remote emergency-stop button, and use of the two-man rule have made it almost impossible for me to grab people. That's why I need the help of my hidden allies more now than ever. Here's how we teamed up to kill the latest victim:

Many of my installed safety features were not working. The load/unload stow-limit switches weren't wired into my safety circuit during installation (numerous technical visits didn't identify or correct this discrepancy). These switches prevent my machinery from running unless the devices are in the stowed position and the station door is shut (when operating two other stations). The door safety on the fourth deck was cheated to indicate it was shut. Once the load/unload device was moved out of the stowed position, I shouldn't have been able to operate. With all the dirt and debris covering these limit switches, however, they wouldn't have worked, even if they had been wired correctly.

The gap between the bottom of the personnel-safety shield and the tip of the conveyor's fingers on my load/unload device (in the stowed position) is 13.5 inches. The safety shield is designed to restrict access to the conveyor trunk when my load/unload device is in the stowed position. The safety shield was installed correctly, as outlined in the ShipAlt for additional conveyor-safety features, but the gap was greater on this ship than most. In this case, there was enough space for people to get their heads inside my trunk.

ne Shadows...

y!

Illustration by John W. Williams

The large, red, run-stop and emergency-stop buttons were missing on the fourth deck where the mishap occurred. The run-stop button on the third deck also was missing.

My allies had been working hard. The crew had cheated my door-safety switches to do unauthorized transfers of stores between intermediate stations (fourth deck to fifth deck). The operating manual specifically prohibits this type of operation. The supervisor, a PO1, knew this mode of operation wasn't authorized but didn't correct the problem.

The supervisor was the only qualified conveyor operator involved in the stores transfer. None of the FSAs assigned to move stores had any formal training on conveyor operations. In fact, no conveyor-training program was being used to teach Sailors how to use the equipment.

No one held safety briefs before this operation started. There was no two-man rule in effect, and no one was communicating (by sound-powered phones) when I claimed the FSA's life.

My doors and controllers had been left unlocked for some time. Sailors from auxiliaries division were responsible for maintaining control of the keys so they could do operational checks on me before use. Those practices fell by the wayside during deployment, and the unauthorized operations started.

All the right circumstances had slipped into place, and the stage now was set for a murderous conclusion. As my fourth-deck roller doors opened, and the light shined into my gaping maw, I saw the FSA. The teeth of my load/unload device were poised for feeding. My waiting almost was over.

After quarters that fateful morning, the supervisor and his assistant, a PO2, decided to consolidate stores for the upcoming inventory. The PO2 sent the FSA to the fourth deck to load stores, while he went to the fifth deck to receive them. The FSA opened my door on the fourth deck and pulled my load/unload device out of the trunk (an unauthorized position for this operating station) to gain access to my carrier trays. He then pushed the down button, but I didn't start. The FSA went to the third deck and told the supervisor I wouldn't operate. The PO1 went to the first deck to check out the problem.

My circuitry will not work unless the main-control station door on the first deck is open, along with another door at a lower station. The supervisor saw the "control relay energized" light wasn't on, so he opened my door on the first deck to energize my circuitry. This action sent a false door-closed signal from the fourth deck because of the jury-rigged door-interlock switch. With everything appearing normal, the supervisor shouted, "Stand clear" down my trunk (another violation of procedures) and pressed the down button. My carrier trays began to descend into the shadows.

On the fourth deck, the FSA started loading boxes on my descending carrier trays. On the fifth deck, the PO2 was busy unloading the boxes. With each Sailor working alone (no two-man

The moment of truth had arrived... his head and neck extended past the point of no return. I instantly pounced on him.

rule) and no formal means of communications between them, I looked on in anticipation. I knew the FSA soon would be mine.

After sending down the last box, the FSA tried to restow my load/unload device in the vertical (stowed) position, while my trays were moving in a continuous down mode. He ignored the warning sign attached to the safety shield, telling him to keep his body out of my trunk during operations. The moment of truth had arrived. As the FSA locked my load/unload device into place, his head and neck extended past the point of no return. I instantly pounced on him.

The FSA cried out in horror as my descending carrier trays grabbed the top of his head and squeezed his neck into the thin gap between two teeth of my vertical load/unload device. My carrier tray kept pushing his head down. Just before it reached the bottom of my load/unload device, Sailors finally stopped me by pushing the emergency-stop buttons on the first and fifth decks. The FSA yelled frantically, “Get it off me,” and tried desperately to free himself. By now, the compression on the front of his neck caused by my crossbar was making it difficult for him to breathe, and the teeth of my load/unload device were cutting off the blood supply to his head.

The supervisor, his assistant, and other FSAs in the area were in a state of panic. They repeatedly pushed the up-travel button on all decks, but I wouldn’t let go. My circuit wouldn’t energize as long as one of the emergency-stop buttons was depressed. In this case, the buttons on both the first and fifth decks were pushed in. The FSA was all mine—no one could save him from my death grip. In a few moments, his cries and struggles stopped, and his life slipped away.

How can you prevent this tragedy from happening again? Follow these suggestions:

Establish a thorough training program for conveyor operation. Ensure everyone involved with operating conveyors is PQS-qualified. The departments maintaining the conveyors should initiate, monitor and maintain this program. Never operate a conveyor without using the two-man rule. Use operational risk management to assess the hazards and hold safety briefs before operating conveyors.

Control conveyor operations. Lock all conveyor controllers and doors when not in use[1]; maintenance personnel should control the keys. Check the conveyor manufacturer’s technical manual for accuracy and the latest updates. Ensure people do required PMS on the conveyors; verify that the maintenance requirements fit your conveyors. Use the checklist[1] to run safety checks before any conveyor operations.

Check the material condition of conveyors. The trunk and safety-limit switches should be free of dirt and debris. Make sure all safety features work. Check the posted operating instructions and warning signs for accuracy and clarity.

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For More Info…

[1]Chapter 572 of the NSTM outlines the requirement to lock all conveyor controllers and doors when not in use. The same chapter contains the checklist and advance change notice dated 10 December 1998 that you should use to assess conveyor operational safety. Also refer to Chapter C2 of OpNavInst 5100.19C (with change 2) and NavEdTra 43111-B for more information.

Taming

By Katie Cipolla,
NavSea Philadelphia, ShipSysEngSta

When the same shipboard machinery that transports chicken wings is capable of ripping off someone's head, there's a problem—for the Sailors operating that machinery, as well as for the engineers responsible for modifying it. The trail of blood from Sailors maimed or killed by vertical-package conveyors, however, may be coming to an end, thanks to engineers at NavSea Philadelphia.

For 17 years, officials here have played the major role in the machinery alterations (MachAlt) program. The efficiency and speed at which they provide instructions and hardware for alterations on flawed equipment literally become a matter of life and death. Depending on the funding priorities for each ship class, a modification then can take years to be approved and installed aboard all ships of the affected class.

NavSea got involved with vertical-package conveyors a couple of years ago when an engineer happened to recognize blood on a conveyor aboard a ship he was inspecting. After learning what had happened, he decided something needed to be done. He created a prototype safety tray that allowed the steel tines (fingers) of the conveyor to be hinged to swing upward (all recorded deaths have occurred when the conveyor trays were going in a downward motion). An accompanying spring mechanism prevents the tines from staying in an upright position.

Conveyor trays currently have the tines rigidly attached to drive chains. The tines usually catch an object between the bottom tray and the load/unload device. If the object is solid enough, it will jam the drive mechanism or bend the tines and snap the chains. If the object is softer, such as a person's head, the conveyor doesn't stop. Instead, it keeps moving with enough force to rip off the body part.

The NavSea engineer's prototype design eventually was patented Feb. 17, 1998. It then was tested aboard USS *George Washington* (CVN 73) and was developed into a preliminary engineering-change proposal. Because of a series of issues and delays, though, the new and improved conveyor tray never was approved for installation aboard ship.

According to the acting section head for the MachAlt program, "MachAlt is the cheapest, best and quickest method for installing the safety-conveyor trays, but that doesn't mean everything goes as planned." In late 1997, the tray made its debut at the MachAlt configuration control board, but the ships' platform managers wanted shipboard testing done (eventually the USS *George*

a Killer

The aircraft carrier USS *George Washington* (in the foreground) served as the test platform for a prototype safety tray in which the tines of a vertical-package conveyor are hinged to swing upward.

Washington prototype) before approving the fix. Because the MachAlt wasn't given a formal OK yet, the program was limited in what role it could assume, and, under previous supervision, it took a passive stance.

Policy deemed that people from life-cycle management and in-service engineering had to iron out all the engineering and testing before a MachAlt program manager would step into the game. This policy meant the technical community had to find the funding, solicit a ship for prototype, contract for the material and installation, develop testing criteria, and evaluate the design. Except for testing and evaluation, these requirements generally are unfamiliar ground for the technical community.

By the time all these steps were complete, none of the original players still were involved. Three section heads had rotated through MachAlt in quick succession. The originator also had taken a new billet. So when the testing was done, no one in the in-service engineering community notified the MachAlt office, and no one in the MachAlt office knew to be looking for test results from in-service engineering. In the meantime, the improved conveyor tray was shelved—temporarily.

"That's how things used to work, but it really made a mess out of program management," noted the acting Machalt section head. "We have changed our policy on how we deal with concepts now." Instead of waiting and letting the technical

So when the testing was done, no one in the in-service engineering community notified the MachAlt office, and no one in the MachAlt office knew to be looking for test results from in-service engineering.

community wade through channels to get a prototype aboard ship, the Technology Development Branch of NavSea in Philadelphia assumes the lead. With this system, development time for the new conveyor tray could have been cut by 18 months.

When the acting section head assumed his current responsibility, he reviewed all the minutes from past meetings of the configuration control board. Those minutes revealed that the safety-tray proposal had been deferred until shipboard testing was complete. He then sent a MachAlt program manager to find the project's originator and revive efforts to implement the safety tray. The program manager learned that the trays aboard USS *George Washington* had been operating for a lengthy period, with one unit recording no jams after moving 79,000 packages and the other unit having only one minor problem. The next step was to reconnect the technical community to the fleet.

The original preliminary engineering-change proposal was reworked for submission to the configuration control board. Because the ships' platform managers had to agree the testing was conclusive and the alteration worthwhile, the MachAlt program office contacted each manager and discussed the entire project, from concept to parts support once the alteration was installed.

The updated preliminary engineering-change proposal was approved April 26, 2000, for formal development. One question remained, though: Who would fund the effort? Flexibility in this area is part of what has kept MachAlt going for 17 years. The program is authorized to receive funding from anyone—port engineers, type commanders, ships' platform managers, OpNav, or ships.

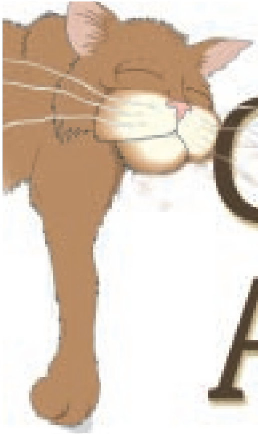
In some cases, this flexibility hinders NavSea Philadelphia. For example, since most MachAlt funding comes from OpNav to do installations class-wide, the waterfront community gets the impression that MachAlts are done free, or at least no cost to them. So why ask the waterfront to pay for an issue like the safety tray? Because with the constant budget demands, it could take years to get funded by OpNav. In the meantime, more Sailors could get hurt or killed.

The most recent death occurred aboard an LHA, so the MachAlt program took the conveyor tray's funding issue to the LHA port engineers. Each was briefed on the costs, benefits and timetable for MachAlt installation, and they agreed to help. Before year's end, the safety trays will be going aboard LHAs and AOE 3, with more ships to follow.

The acting section head for the MachAlt program is glad the safety trays are going aboard ship, but he wishes installation had happened sooner. He points out that policy has been changed to speed up getting alterations to the fleet. "The last dozen MachAlts we've developed have an average time of six months from the writing of the preliminary engineering-change proposal to the time kits are fully developed."

Funding always will be an issue, but, according to the acting section head for the MachAlt program, "having these alterations ready to go quickly can only help." In the case of the conveyor safety tray, it's an alteration that couldn't be developed soon enough, but it now has the fast track.

The author was a summer hire at NavSea Philadelphia, ShipSysEngSta, when she wrote this article. By now, she is back in classes at the University of Delaware.



Curiosity Doesn't Always Kill

By GSCS(SW) Brad Spahnie,
Naval Safety Center

In some cases, it just makes you dizzy and burns your nose. Ask a PO3 who went looking for an anti-seize compound to finish a maintenance job.

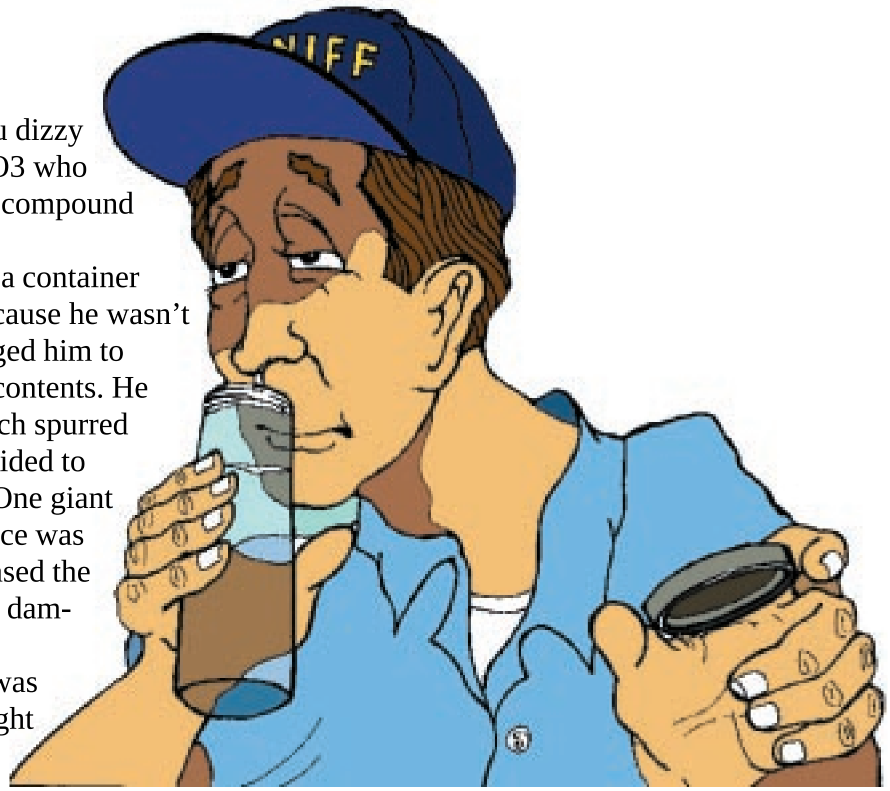


Illustration by DM1(AW) Eulogio Devera

The petty officer came across a container marked “sealing compound.” Because he wasn’t familiar with it, his curiosity begged him to open the container and check its contents. He found a paint-like substance, which spurred him to investigate further. He decided to see how the compound smelled. One giant sniff later, he realized the substance was toxic. Corpsmen treated and released the curious Sailor with no permanent damage.

On another occasion, an E-2 was changing the batteries in a flashlight when he had an overwhelming urge to explore the mystery of what made the batteries work. He grabbed a pair of scissors and was dissecting one of the batteries when acid squirted in his left eye. With his curiosity satisfied, he hustled to sickbay.

Later, a PO3 entered the space where the E-2 had left his experiment and soon found himself drawn to it. Picking it up, he pulled out the scissors, and acid shot into his right eye. He arrived in sickbay in time to be checked by a corpsman and to accompany his shipmate to base medical.

These examples of bad judgment show why it’s so important to stay alert to potential hazards. Always check with your supply officer or workcenter supervisor for copies of the latest MSDSs[1] for hazardous material. These sheets identify the material and describe its chemistry, hazards and precautions for use and handling. They tell how the chemical can attack your body, and they list emergency first-aid procedures.

If you come across an unfamiliar substance and are intrigued by it, I urge you to read the MSDS. Someone already has researched the answer. All that’s required of you is to read and understand it.

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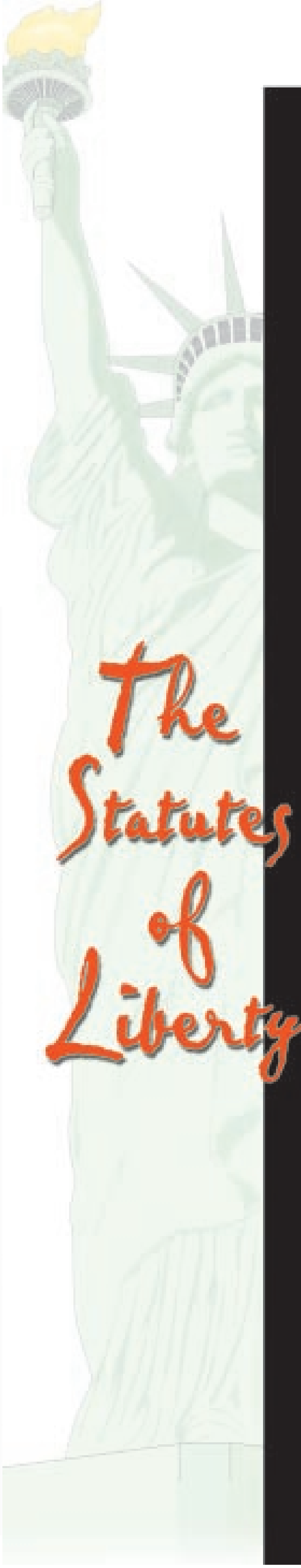
For More Info...

[1]Material safety data sheets are on the Hazardous Material Control and Management, Hazardous Material Information Material System in CD-ROM format. To get a copy, write the Naval Computer and Telecommunications Area Master Station, Atlantic, 9625 Moffett Ave., Norfolk, Va. 23511-2784. You also can send e-mail to cdrom@norfolk.navy.mil, phone (757) 445-9192, or fax (757) 445-4842.



The Statutes of Liberty

By Lt. Paul Berthelotte,
USS Anchorage *(LSD 36)*

When Sailors trade their controlled shipboard environment for the free-wheeling, ready-for-anything liberty world, they are thinking of fun, not hazards. Add booze and late nights to the situation, and you have all the ingredients for trouble, whether it's getting beat up in a fight or falling off a pier and drowning.

As I learned during a deployment aboard a cruiser, however, there are ways to control the risk of mishaps. One method we used was the buddy system, which requires everyone who goes on liberty to leave the ship with at least one other person. This system ensures you have help getting out of tight spots. It also lets one person be responsible for getting a group back to the ship, whether it's by bus, taxi or liberty boat. (While overseas, we weren't allowed to rent or operate motor vehicles.) The buddy system is extremely effective in countries where English is a foreign language.

As it turned out for one of our Sailors, the buddy system also can save you from going to jail. The Sailor and two buddies on liberty with him in Bahrain were waiting outside a club that had closed. They hailed a taxi and went to their hotel room, unaware of the chain of events taking place inside.

It seems that a bouncer from the club where the three had been got into a dispute with another American and mistakenly identified our Sailor as the troublemaker. Officials from the Naval Criminal Investigative Service tracked him to the hotel room and were prepared to charge him. However, his two buddies confirmed his story word-for-word, so the investigation shifted, and the real culprit was caught.

The buddy system is effective, but the liberty-risk program run by the CPO mess aboard my cruiser was even better. This program allows the command to monitor the actions of Sailors who misbehave.

When our ship left for deployment, the CO explained the rules of the program to everyone. Shipmates who had a problem on liberty were placed in a liberty-risk category depending on the severity of their trouble. The lightest category was Class Alpha: Sailors couldn't drink, and they had to be back aboard by 1830 for muster. Class Bravo required Sailors to be escorted on liberty by an E-5 or above (or an equivalent pay grade for more senior personnel), and they, too, had to return to the ship by 1830 for muster. Sailors in Class Charlie were not allowed off the ship.

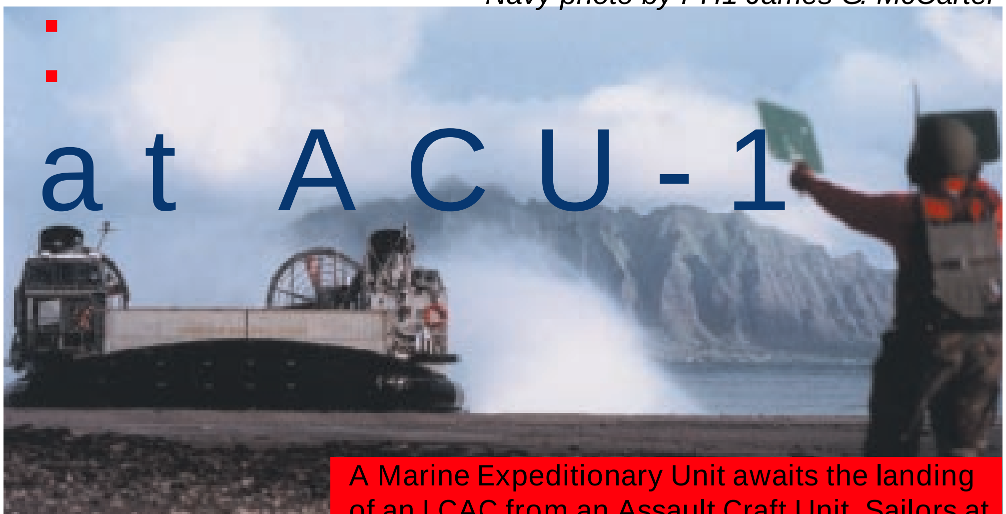
If they stayed out of trouble, they moved up one category for each port, so no one ever stayed on the risk list for more than three port calls. Of course, Sailors who ended up in Class Charlie the last day in the Gulf knew they would miss every port call (one in Bali and two in Australia) on the way home. This knowledge proved to be more than enough deterrent for would-be irresponsible crewmen.

The liberty-risk program won't stop a Sailor from jumping off the fantail onto a pier, as we learned during our port call in Sydney. However, it does help to prevent a few troublemakers from ruining liberty for all their shipmates.

The author was assigned to the Naval Safety Center when he wrote this story.

ORM: SOP at ACU-1

Navy photo by PH1 James G. McCarter



A Marine Expeditionary Unit awaits the landing of an LCAC from an Assault Craft Unit. Sailors at ACU-1 use operational risk management in planning all missions.

By Ltjg. Land Anderson, ACU-1

Case 1:

A fleet commander schedules an amphibious operation months in advance. All the participants know their parts. The Marines launch toward the beach. As they approach the entrance to the bay in 17 combat rubber raiding craft, they are startled by waves up to 20 feet high. The day ends with one Marine dead, 10 injured, and thousands of dollars of equipment lost.

Case 2:

Personnel use LCACs and LCUs to offload Marine Corps vehicles from an LSD as part of an amphibious exercise. Procedures call for moving a vehicle from the flight deck, down through the truck tunnel, then positioning it on a turntable, which revolves clockwise until the vehicle lines up with a ramp. Once an LCAC or LCU is ready for loading, personnel roll a vehicle down the ramp, into the welldeck, then into the landing craft.

The procedures work smoothly until afternoon, when the LSD ballasts down to get 8 feet of water in the welldeck. An LCU is scheduled to deliver cargo that's to be loaded aboard an LCAC for transfer ashore. When the water level reaches 6 feet, with a two-degree trim by the stern, disaster strikes.

An unchocked, five-ton truck with a trailer attached is on the turntable and aligned with the ramp. Personnel had parked the equipment there earlier. Suddenly, the truck and trailer roll down the ramp and slam into a Marine. Corpsmen from the ship's medical team start CPR on the victim and move him to an LHA, where doctors pronounce him dead.

These mishaps, as discussed in the June-July 1990 and May-June 1992 issues of *Fathom*, respectively, are typical of what can happen when a command doesn't use operational risk management (ORM). At Assault Craft Unit One, though, we use ORM in all our plans for landing-craft missions, including beaching, station-keeping, combined operations with LCACs, and welldeck operations. We also use ORM in operations with USMC rubber-raiding craft. It prepares everyone for the expected, as well as the unexpected.

Our ORM process for landing-craft beaching incorporates such factors as range of tide, littoral current, obstructions, weather, visibility, beach gradient, man overboard, engineering casualty, and personnel offload. The mission planning requires a craftmaster to evaluate the severity and probability of each hazard, and to assign a risk-assessment code to each one before the operation starts.

As part of our process, we also evaluate conditions in real time, list problems, implement controls, and provide feedback for future use. Here are examples of controls we use for operations in heavy seas:

- Require people to use a safety harness.
- Limit the number of people topside.
- Set no-go criteria to cancel operations.

The final step before every event is an operational brief with the CO.

In short, ORM has become an everyday way to ensure safe amphibious operations, focus on important details, implement controls, and review lessons learned.

Ltjg. Anderson is the engineering and safety officer at ACU-1. His e-mail address is cheng@acu1.navy.mil.

Pigeon to th

By Cdr. "JES" Sutton,
Naval Safety Center,
BMC(MDV) Duncan Allred,
Fifth Force Recon Co., and
HMC(DV) Fernando Juarez,
Naval Operational Medicine Institute

On a cold, February day in 1992, a Marine CH-46E helicopter crashed off the coast of Ventura, Calif. Eight of the nine Marines aboard escaped. The ninth, though, was not found and was presumed to be in the helicopter.

The task of recovering the missing body and salvaging the helicopter was assigned to the divers and crew of USS *Pigeon* (ASR 21), which was one of only two submarine-rescue and deep-ocean-salvage catamarans in the U.S. Navy in 1992. After a quick load-out of diving and sonar equipment from Deep Submergence Unit, San Diego, divers did work-up dives to acclimate themselves with the anticipated depths of the task ahead.

Crewmen aboard *Pigeon* searched for the downed helicopter for two days. Once they found it, the ship went into a modified, three-point moor, and divers prepared to make the first set of dives. They recovered the body of the missing Marine, then began salvaging the aircraft for delivery to NAS, North Island.

Although no formal instruction on operational risk management (ORM) existed yet, *Pigeon* divers applied ORM principles to everything they did. At the time, there was a chapter (now there are two) in the *U.S. Navy Diving Manual* devoted to identifying and controlling risk during diving operations. *Pigeon*'s diving officer and master diver used that guidance to plan the recovery operation. They also made sure their divers were prepared for any changes that might occur, and it's a good thing they did, because the picture changed rapidly during one dive.

Divers found the helicopter upside down, in 145 feet of seawater, with its rotor hubs buried in 4 feet of mud and clay. Using a fire hose lowered from the ship, red and green divers were able to clear away the mud and clay and attach a wire-rope lifting sling around the rotor hubs.

As topside personnel lowered this sling to the bottom, it became entangled in red and green divers' umbilicals and their descent line. The divers reported the fouling to the master diver (acting as diving supervisor topside), who decided to lower the descent line, umbilicals, and lifting sling as a group. This action would let the divers try to untangle their lines.

When the cluster of line and hose arrived on the bottom, red and green diver reported that the lifting-sling wire had worked its way around both umbilicals, the descent line, and itself, forming several knots in the process. The divers worked to free the wire rope from the descent line and umbilicals, but it was slow and tedious work, given the poor visibility and cold water. To make matters worse, the end of a 30-minute planned dive was fast approaching.

Red and green divers finally freed the line and umbilicals from the wire rope, but they exceeded the time limit of the planned decompression schedule. Topside, the master diver decided to switch to a different table and schedule, a decision that would involve greater decompression time in the water. Because of these complications, the dive was aborted, and red and green divers prepared to return to the surface.

As the tenders pulled the divers toward the surface, red diver felt himself growing heavier—something was holding him back. He reported the problem to the diving supervisor, but, before anything could be done, red diver was pulled away from green diver's grasp by whatever was holding him back. The tenders immediately stopped their recovery efforts, and the master diver reassessed the situation.

Meanwhile, down below, red diver discovered that the descent line was preventing his ascent to the surface. Apparently, when topside had slacked the lines so the divers could free the lifting-sling wire, the descent line had become fouled on the emergency bottle of air strapped to red diver's back. Something had to be done, and fast, because the limit was approaching for the new decompression schedule. It was the last table and schedule available for this depth of dive.

Thinking quickly, red diver flipped upside down in an effort to free himself, but the descent line still clung to his bottle. The master diver ordered the tenders to lower green diver, so he could free red diver, but green diver was unsuccessful. With the time limit about to expire, the master diver ordered green diver to cut the line with a knife. Because of the many knots in the fouled line, it took nearly 15 minutes to cut through the descent line and free red diver. Both divers were ready to travel back to the surface, but there was one problem: They had exceeded the decompression-time limit. An informed decision, taking into account all the risks involved, had to be made to avoid a mishap.

Keeping his cool, the master diver elected to call experts at the Naval Medical Research Institute (NMRI). At the time, the divers, doctors and scientists at NMRI were the ones who had written the Navy decompression tables. After hearing about the situation involving *Pigeon*, the NMRI scientists recommended following the current in-water schedule, then shifting to a treatment table (TT)-6 when the divers arrived on the surface. This plan would allow recompression treatment to start immediately, in the event it was needed. Because decompression would be omitted, there was a very real possibility that the divers could suffer from decompression sickness or an arterial gas embolism.

The master diver, acting on the advice of NMRI scientists, ordered red and green divers to ascend, all the while adhering to the in-water decompression schedule they had been using up to that point. Their ascent was uneventful, and the divers were brought up and over the side of *Pigeon* and placed in the recompression chamber to begin surface decompression using TT-6. Quarters were cramped inside the chamber, but both divers remained in good physical condition throughout the entire treatment.

Despite the changes that occurred during this dive, everyone stayed calm. Two days and many less-eventful dives later, the crew of *Pigeon* recovered the downed helicopter. The planning, training and risk assessment that went into the recovery operation undoubtedly averted a potential disaster.

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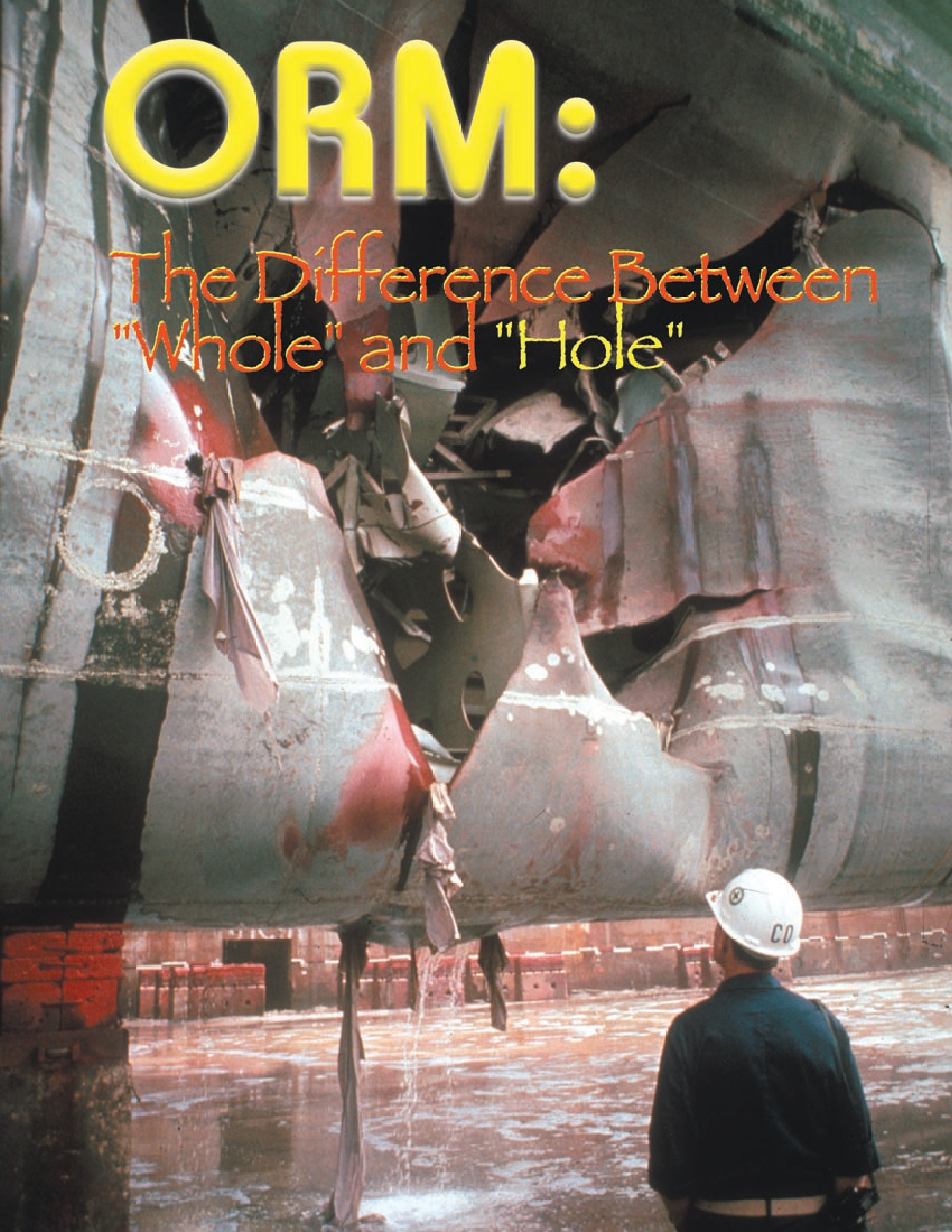
Divers and crewmen aboard *Pigeon* pose for a photographer once recovery efforts are complete.

Departments


ORM:
The Difference Between
"Whole" and "Hole"
CD